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71 Applicant: Day, San-Tong
1, Chung Yang North Road
Ching Shui Taichung Hsien(TW)

72 Inventor: Day, San-Tong
1, Chung Yang North Road
Ching Shui Taichung Hsien(TW)

74 Representative: Lawson, David Glynne et al,
MARKS & CLERK 57-60 Lincoln's Inn Fields
London WC2A 3LS(GB)

54 A fully automatic single push button type umbrella.

57 An umbrella automatically openable and closable by a single push-button operation comprises an outer tubular shaft 1 having a lower ring 11 fixed on the upper end thereof; an intermediate tubular shaft 2 slidably inserted in the outer tubular shaft and having an intermediate ring 21 on the upper end thereof; an upper inner shaft 4 slidably inserted in the upper end of the intermediate tubular shaft and having an upper ring 41 fixed on the upper end thereof; a lower inner shaft 3 slidably inserted in the lower end of the intermediate tubular shaft and having on the lower end thereof a grip, with operably mounted thereinside a first spring pawl 9 attached with a push-button 6 on the lower end thereof and a second spring pawl 95; a first spring 7 fitted over the intermediate tubular shaft between the intermediate ring and the lower ring; and a second spring 8 mounted inside the intermediate tubular shaft between the upper inner shaft and the lower inner shaft.

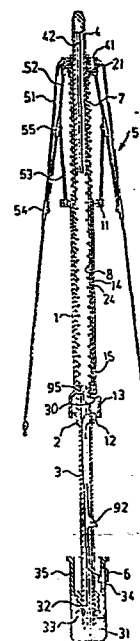


FIG. 3

A FULLY AUTOMATIC SINGLE PUSH BUTTON TYPE UMBRELLA

The present invention relates to automatically openable and closable umbrella, more particularly, to an umbrella which can be opened and closed automatically by operating a single push button.

5 Several types of automatic umbrella which can be opened and closed automatically have been disclosed in the past, to take for example, U.S. Patent No. 3,856,030 to Sato. In the prior art, the umbrella employs, however, two push button means for operation of opening and closing respectively. Such an
10 umbrella is not only complicated in construction, but also difficult and troublesome in assembling, and hence ends in its high cost. Besides, since the operating mechanism occupies more spaces, consequently, the space for operating such a mechanism has to be enlarged, this will inevitably affect the aesthetic
15 design of the umbrella. Furthermore, since there is no safety device in the push button means, if a wrong push button means is operated, the umbrella which has been opened may be mistakenly closed or it may result in malfunction of the means.

It is, therefore, an object of the present invention to
20 obviate shortcomings of the conventional automatic umbrella previously discussed, and to provide a fully automatic umbrella that can be opened and closed by operation of a single push button.

Another object of the invention is to provide a single-
25 push-button-controllable, automatic umbrella wherein the push button means is a double-lock mechanism which prevents the umbrella from opening to closing wrongly or from causing malfunction of the members when a person presses a wrong means accidentally.

30 A further object is to provide a single-push-button-controllable, automatic umbrella wherein the push button means for operation is slender and simple, and which enables the operational portion of the umbrella to be aesthetically designed.



An additional object is to provide such an umbrella which is simple in construction, easy to manufacture and whose cost of production is low.

Other aspects and advantages of the present invention
5 will become apparent from the following description of the preferred embodiment, taken in conjunction with the accompanying drawings in which:

Fig. 1 illustrates an umbrella of the invention in partly sectional elevation in the closed and folded state;

10 Fig. 2 shows an umbrella of the invention in partly sectional elevation in the fully extended position;

Fig. 3 depicts an umbrella of the invention in partly sectional elevation in the closing state from the position as shown in Fig. 2;

15 Fig. 4(A) is a sectional view of the portion of the umbrella taken along the line A-A in Fig. 1;

Fig. 4(B) is a longitudinal sectional view of portion of the members as shown in Fig. 4(A);

20 Fig. 5 illustrates a portion of the lower inner shaft member wherein axial slot and openings are shown;

Fig. 6 is an enlarged sectional view of a detail of operation of the push button mechanism shown in Fig. 1; and

Fig. 7 is a sectional view of the components of another embodiment showing the engaging means of the outer shaft member.

25 Referring initially to Fig. 1, an automatic umbrella of the invention comprises an outer tubular shaft 1, an intermediate tubular shaft 2, a lower inner shaft 3, an upper inner shaft 4, a plurality of ribs 5, an operational push button 6, a first coil spring 7 and a second coil spring 8. The outer shaft 1
30 has at the upper end a lower ring 11 fixed thereto and the intermediate shaft 2 is slidably inserted in the outer shaft 1 and is provided at the upper end with an intermediate ring 21 fixed thereto. Of the two inner shafts, the lower shaft 3 is slidably inserted in the lower end of said outer shaft 2 and
35 has at the lower end a grip 31, whereas the upper shaft 4 is

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slidably inserted in the upper end of the intermediate shaft 2 and is provided at the upper end portion with an upper ring 41 fixed thereto. Said rings 11, 21 and 41 are carrying pivotably each one end of ribs 5, and surrounding the upper portion of the intermediate shaft 2 and between the intermediate ring 21 and lower ring 11 there is mounted the first coil spring 7. The push button 6 is operably disposed between the lower inner shaft 3 and the upper portion of the grip 31, and encased in the intermediate shaft 2 and between the upper inner shaft 4 and lower inner shaft 3 there is mounted the second coil spring 8.

While the upper end of the abovementioned outer tubular shaft 1 is provided with the lower ring 11, the lower end is formed into an enlarged tubular portion 13 having an inwardly extending annular flange 12. In addition, two openings 15, 14 are formed at the lower end portion and the middle portion on one side of the outer shaft 1 respectively for engaging with the second spring pawl 95 which will be described hereinafter. The intermediate shaft 2 being slidably inserted in the outer shaft 1 is longer than the latter and having at the upper end an intermediate ring 21 fixedly mounted thereto; the inner sides of the upper and lower end portions thereof are further formed with at least one, preferably two according to the present embodiment, symmetrically and inwardly guide convex portions 22, 22 as shown in Figs. 4(A) and 4(B). When in operation, said two convex portions 22, 22 prevent the upper and lower inner shafts 4, 3 from rotating inside the intermediate shaft 2, and also act as guide-projection when the two inner shafts 3, 4 are sliding up and down therein. In addition, two opening 23, and 24 are defined on one side in the wall of the intermediate shaft 2 at the lower end portion and the middle portion thereof respectively. The former is located between the two convex portions 22, 22 to allow the enlarged locking head 92 of the first spring pawl 9 (which will be described hereinafter) to be engaged therein, and the latter is located above the first spring pawl 9 to allow a second spring pawl 95

to be engaged therein. Both the lower inner shaft 3 and upper inner shaft 4 are defined with at least one, but preferably two symmetrically arranged guide-grooves 32, 42 as illustrated in Figs. 4(A) and 4(B). While the upper portion of the lower
5 inner shaft 3 is slidably inserted in the lower portion of the intermediate shaft 2, the lower portion of the upper inner shaft 4 is slidably inserted in the upper portion thereof, and further, the convex portions 22, 22 formed at the upper and lower end portions of the intermediate shaft 2 are engaged in the guide-
10 grooves 42, 32 of the lower and upper inner shafts 3, 4 to impede rotation thereof in the intermediate shaft 2. The grip 31 is fixedly mounted to the lower end portion of the lower inner shaft 3 by a locking pin 33 provided therewith, and above the upper end portion of said grip 33 there is mounted an sleeve
15 member 35 having at one side an oblong opening 34 and receiving the push button 6 operably disposed therein.

Located inside the lower inner shaft 3 and extending almost the whole length thereof is the first spring pawl 9 whose fixed end 91 is fixed in a recess 37 defined in the upper portion of
20 the lower inner shaft 3 and in the middle portion of the spring pawl 9 there is formed an enlarged locking head 92 protruding from the front end portion of an elongated slot 38 formed in the lower inner shaft 3 while the other end thereof is formed with a F-shaped projection 93 being more extended than the
25 locking head 92 and having a notch 94 thereof. The projection 93 is protruding behind the elongated slot 38 into the push button 6 which is slidably mounted therto. The push button 6 is in turn protruding from the opening 34 of the sleeve member 35, and has at the below front portion thereof a hole 61 adapted
30 to be slidably engaged with the projection 93, while at the hinder end thereof a hook portion 62 is extending below and forward and adapted to be engaged with the notch 94 in the hinder side of the projection 93. Between the inner front wall of the hole 61 and the projection 93 there is mounted a spring 63 adapted
35 to urge the push button 6 always in the forward position so that the hook portion

62 is engaged with the notch 94. Behind the aforementioned slot 38 there is formed continuously therewith an enlarged rectangular opening 39 which coincides with the opening 34 of the sleeve member 35. Above the first spring pawl 9 there is provided with the second spring pawl 95 at the upper end of the inner shaft 3, the locking head 96 of which is protruding from the opening 30 into the opening 24 of the intermediate shaft 2.. An upper ring 41 is fixedly mounted to the slightly mid portion of the upper inner shaft 4, the upper tip of which is screwed with a cap 43.

A plurality of ribs includes usually 8 to 10 dome ribs, a same number of stretcher ribs 52 and a same number of supporting ribs 53. One end of each dome rib 51 is pivotably mounted at the upper ring 41 while the other end remains free and the middle portion thereof, on the other hand, is mounted with a pivot member 54 adapted to connect pivotably with one end of the stretcher rib 52, the other end of which is, again pivotably mounted at the intermediate ring 21. The middle portion of the stretcher rib 52 is also mounted with a pivot member 55 adapted to connect pivotably with one end of the supporting rib 53 while the other end thereof is pivotably mounted at the lower ring 11. The coil spring 7 provided in between the intermediate ring 21 and lower ring 11, is in freely extended condition when the umbrella has been closed as shown in Fig. 1; on the other hand, the coil spring 8 is in the compressed condition when the umbrella has been closed, and tends to urge the upper inner shaft 4 and lower inner shaft 3 upward and downward respectively. However, since the intermediate shaft 2 and outer shaft 1 are all locked by way of the locking heads 92 and 96 of the two spring pawls 9 and 95 at this time, the coil springs 7, 8 are unable to pull apart the intermediate shaft 2 and the outer shaft 1, and the upper inner shaft 4 and the lower inner shaft 3.

In one embodiment, an opening 16 which coincides with the opening 23 of the intermediate shaft 2 may be defined in the

lower end portion of the outer shaft 1 in place of the aforementioned annular flange 12 as shown in Fig. 7.

In operation, when the automatic umbrella of the invention is in fully closed position as shown in Fig. 1, the ribs are
5 completely turned down: the coil spring 7 is fully extended and released while the coil spring 8 is being compressed, thereby elastic energy is accumulated. At the same time, the outer tubular shaft 1, the intermediate tubular shaft 2 and the lower inner shaft 3 are all being locked by the two spring
10 pawls 9 and 96 so as to keep the umbrella in the closed condition. Furthermore, the push button 6 being positioned in the upper part of the opening 34 has the hook portion 62 thereof engaging in the notch 94 of the projection 93.

In the process of opening of the umbrella from its closed
15 position, the push button 6 is depressed and with the fixed end 91 as a supporting point in against the resilient force of the spring pawl 9 the projection 93 is being pulled down thereby till the locking head 92 is disengaged from the outer shaft 1 and retracts into the opening 23 of the intermediate shaft 2.
20 Because the push button 6 has been so mounted, that when it is in a forward position, it can be depressed down to a length only whereby the locking head 92 was just released from engagement in the flange 12 of the first outer shaft 1, i.e., a slight distance of d , but is still engaged in the opening 23
25 of the intermediate shaft 2. Hence, the intermediate shaft 2 and the lower inner shaft 3 are still maintained in an engaging manner. The released outer shaft 1 being biased by the upward extension force of the coil spring 8 forces the second spring pawl 95 to disengage from the opening 14, and the upper inner
30 shaft 4 to move upward with respect to the intermediate shaft 2, and consequently, the upper ring 41 is also moved upward along with the upper inner shaft 4. Although the ribs 51 which are pivotably mounted to the ring 41 tend to move upward along with the latter, however, since the mid portion of the rib 51
35 is pivotably connected with one end of the stretcher rib 52,

the other end of which being pivotably mounted to the intermediate ring 21 and further, the intermediate ring 21 being held fixed with respect to the intermediate shaft 2, the dome ribs 51 are, therefore, turned up gradually as the upper ring 41 is being extended upward and the stretcher rib 52 with the pivot point of the intermediate ring 21 as center is moving upward. Along with the upward movement of the stretcher ribs 52, the supporting ribs 53 pivotably connected thereto in against the spring force of coil spring 7 pulls up the outer shaft 1 with respect to the intermediate shaft 2. The coil spring 7 in between the intermediate ring 21 and lower ring 11 is therefore compressed by the upward extension of the outer shaft 1 and an elastic energy is accumulated thereby for use in closing the umbrella next till the second spring pawl 95 engages in the lower opening 15 of the outer shaft 1. When the coil spring 7 is fully compressed and both forces of the springs 7, 8 are in equilibrium state, the upper inner shaft 4 and the outer shaft 1 extend no more and the coil spring 8, still retaining some extension force, is in a partially extended condition. The umbrella is opened now in a fully extended state ready for use as shown in Fig. 2.

When an umbrella which has been opened in next to be closed, the push button, as illustrated in Fig. 6, is depressed downward in against the spring force of the coil spring 63 and then toward the enlarged opening 39. The push button 6, in opposing the elastic force of the spring pawl 9 and being in exactly above said opening 39 now, is moved into the undermost position whereby the locking head 92 is disengaged from the opening 23 of the intermediate shaft 2. Although the partial extension force of the coil spring 8 tends to urge the lower inner shaft 3 to move downward, in other word, to push said shaft 3 outward, nevertheless, since the grip is held firmly by a person and the lower inner shaft 3 is stationary, the extension force of the second coil spring 8 acts instead on the upper inner shaft 4 which is made to slide upward and to

bring the ribs 51 to close thereby. Meanwhile, as the intermediate shaft 2 is in a freely slidable state, the extension force of the first coil spring 7 acts via the intermediate ring 21 to urge the intermediate shaft 2 to move upward and the outer shaft 1 downward. When the intermediate shaft 2 moves upward, the second spring pawl 95 is forced to retract into the opening 30 and to be disengaged from the hole 24 and 14 by the lower side wall of the hole 24 cooperating with the slop of the locking head, thus the outer tube then slides downward relative to the intermediate shaft 2. The movement of the two shaft 1, 2 cause the ribs to be turned down to the closing position through the linked movement of stretcher ribs and supporting ribs 52, 53 along with the rings 11, 21 and 41 respectively till both coil springs 7 and 8 are in their extended and substantially unstressed condition, and the umbrella is closed as shown in Fig. 3. As a next and final step of the series of operations, the shaft is contracted by holding the umbrella down against the ground or any hard surface and applying compression force at the opposite ends of the shaft, i.e., at the tip of the upper inner shaft 4 and the grip 31, in opposing the extension force of the coil spring 8. As the compression force is applied, the lower inner shaft 3 is inserted deeply into the intermediate shaft 2 by compressing the coil spring 8 until the locking head 92 of the first spring pawl 9 in the lower inner shaft 3 engages into the opening 23 of the intermediate shaft 2 and protrudes into the enlarged tubular portion 13 of the outer shaft 1 thereby locking against the engaging means 12 and making the intermediate shaft 2 and the outer shaft 1 a single shaft together with the upper inner shaft 3. On the other hand, the compression force of the first coil spring 7 has now weakened and is in a free state whereas the second coil spring 8 is in a compressed position and the energy is accumulated thereby to be consumed for automatically closing umbrella after it has been opened.

In the embodiment described above and shown in Fig. 1 through 7, not only is the operation of opening and closing of the umbrella that can be performed with a single push button, but also the misfunction or malfunction of the mechanism can be avoided due to the function of the double-lock construction. In achieving the closing of the umbrella when it is in an opened state, the push button 6 must be depressed downward in against the extension force of the spring 63 and then toward the inner side of the sleeve member 35 so that the intermediate shaft 2 is disengaged from the upper inner shaft 3; nothing will happen if the push button is merely pressed or pulled down. Hence, the umbrella which has been opened will not close if the push button is accidentally pressed on. Furthermore, unlike the conventional automatic umbrella wherein different push buttons have to be operated separately, the umbrella of the invention is very convenient to use. Still further, the umbrella according to the invention is simple in construction and the push button portion can be esthetically designed accordingly.

Although the invention has been described in detail with reference to its presently preferred embodiment, it will be understood by one of ordinary skill in the art that various modifications can be made without departing from the spirit and scope of the invention.

Claims

1. An automatic umbrella comprising a shaft (1,2,3,4), a handle (31), a rib assembly (5), and springs (7,8) and control means (6) for erecting and collapsing the umbrella,
- 5 characterised by an outer tubular shaft (1) having a lower ring (11) fixed to the upper portion thereof, an engaging means (13) formed at the lower end portion thereof, and two openings (14,15) formed at the middle and lower portions thereof;
- 10 an intermediate tubular shaft (2) having said outer tubular shaft (1) slidably housed thereto, an intermediate ring (21) fixed to the upper portion thereof, at least one convex portion formed at the walls of the upper and lower portions thereof, and
- 15 two engaging openings (23, 24) provided on one side in the wall of the lower portion and the middle portion thereof;
- a lower inner shaft (3), slidably insertible in the lower end portion of said intermediate tubular
- 20 shaft, having a grip (31) mounted to the lower end of the portion protruding from said intermediate tubular shaft thereof, first and second spring pawls (9,95) provided therein at the lower and upper end portions for engaging and disengaging said
- 25 intermediate shaft and said outer tubular shafts, and a push button member (6) adapted for controlling

the first spring pawl (9), said push button being slidably mounted to the lower end of the first spring pawl and positioned in the upper portion of said grip;

5 an upper inner shaft (4) slidably insertible in the upper end portion of said intermediate tubular shaft (2), having a cap (43) on the upper end thereof and an upper ring (41) fixed at the upper portion thereof;

10 a plurality of ribs including dome ribs (51) one end thereof being pivotably connected to said upper ring (41) and the other end being free, stretcher ribs (52) one end thereof being pivotably connected to said intermediate ring (21) and the other end being
15 pivotably connected to the near-middle portion of said dome ribs, and supporting ribs (53) one end thereof being pivotably connected to the lower ring (11) and the other end being pivotably connected to the near-middle portion of said stretcher ribs;

20 a first spring means (7) for closing the umbrella and provided on the upper end portion of said intermediate tubular shaft and between said intermediate and said lower rings; and

a second spring means (8) adapted for opening the
25 umbrella being provided in said intermediate tubular shaft and between said upper and lower inner shafts.

2. A fully automatic single push button umbrella according to claim 1, characterised in that said lower inner shaft (3) is formed with an axially elongated slot (38) having an enlarged opening (39) at the lower end thereof and an upper opening on upper end portion of said lower inner shaft, inside the lower inner shaft there being provided a first spring pawl member (9) and a second spring pawl member (95) for locking said intermediate tubular shaft and outer tubular shaft, the upper end of the former being fixedly attached to the upper end wall of said lower inner shaft, the lower end being free and provided with a projection protrusible from the lower end of said elongated slot, and the middle portion being formed with a locking head (92), said locking head being protrusible from the upper portion of said elongated slot, and said projection being slidably engageable with said push button member (6) and the second spring pawl member (95) being engageably mounted to the upper end portion of the lower inner shaft above the first spring member; when the umbrella is in closed position, said locking head (92) of the first spring pawl (9) is engaged in the lower opening (23) of said intermediate tubular shaft and the engaging means (12) of said outer tubular shaft, and the second spring pawl (95) is engaged in the upper opening (24) of the intermediate tubular shaft and the upper opening (14) of the outer shaft, and when the umbrella

is open, said locking head (92) is engaging in the lower opening (23) of said intermediate tubular shaft only, and the second spring pawl (95) is engaging in the upper opening (24) of the intermediate tubular shaft (2) and
5 the lower opening (15) of the outer tubular shaft (1).

3. A fully automatic single push button umbrella according to claim 2 characterised in that said push button member (6) comprises a sleeve member (35) mounted on the front end of said grip and provided with a push
10 button opening (34) in the side thereof which coincides in position with said enlarged opening (39) of the elongated slot; a push button (6) which is mounted in the push button opening of said sleeve member and is slidably engageable in the projection of said first
15 spring pawl member through the opening therebelow, having underneath a hook portion (62) engageable in a notch (94) formed at the underside of said projection; and a spring means (63) which is provided in a cavity of said push button, between the front wall of said cavity
20 and the front end of said projection, whereby said push button is always biased towards the front side and said hook portion thereof is made to engage in said notch.

4. A fully automatic single push button umbrella according to claim 2 or 3 characterised in that said push button (6) is arranged such that there is an operating distance provided thereunder, whereby said push button can be pushed deep enough only to disengage said locking head (92) of said first spring pawl member from said engaging means (12) of said outer tubular shaft, said locking head remaining engaged in said opening (23) of said intermediate tubular shaft when said push button is depressed in the normal position, and on being further pulled downward and depressed into said enlarged opening, said push button will thereby pass through said enlarged opening, said locking head (92) being moved downward to be disengaged from said two openings of said intermediate and outer tubular shafts.

5. A fully automatic single push-button umbrella according to claim 1, 2, 3 or 4, characterised in that wherein said second spring means (8) is in compressed condition whereas said first spring means (7) is in unstressed and freely extended condition when said umbrella is in fully closed position; when said umbrella is in opened position, said first spring means (7) is in its compressed state and said second spring means (8) is in a partially compressed condition; when said umbrella is to be closed from its opened condition, said first spring means (7) will be extending and in free state whereas said second spring means (8) will still be in the unstressed or extended state.

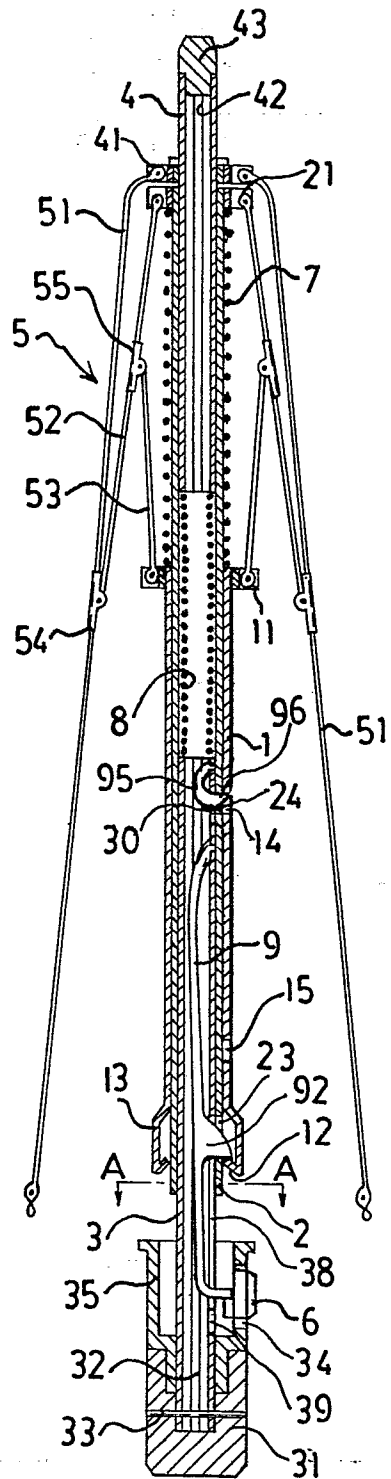


FIG. 1

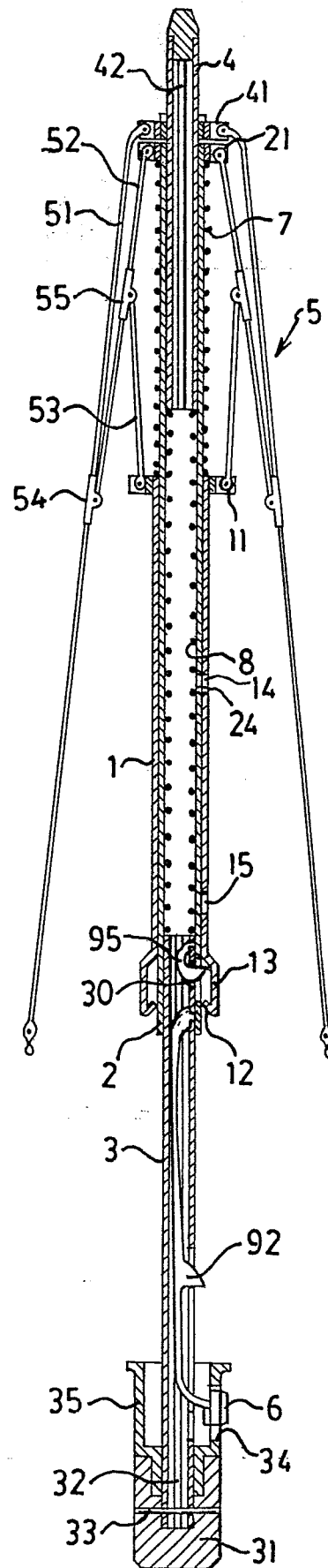
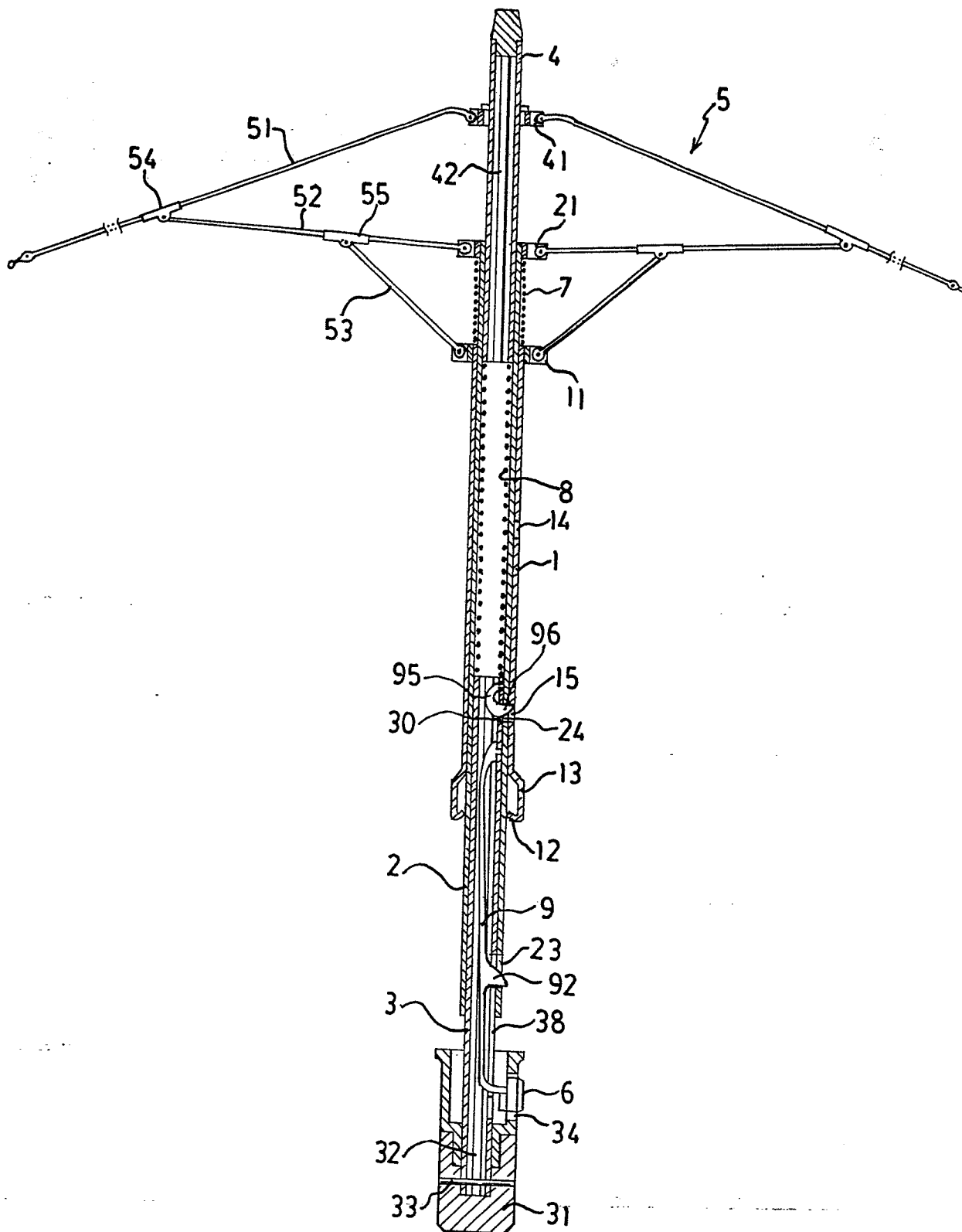


FIG. 3



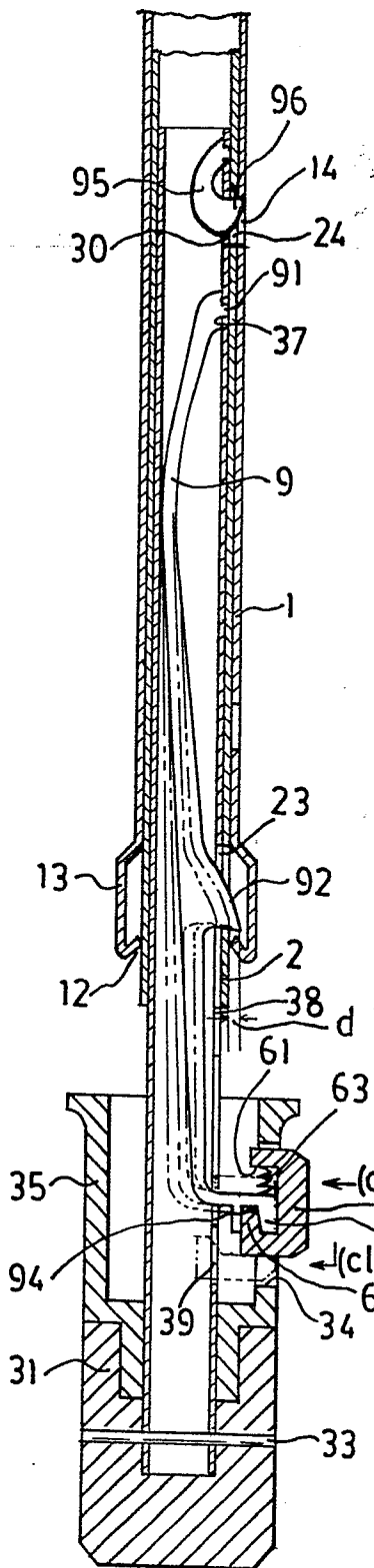


FIG. 6

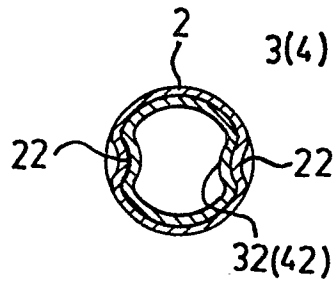


FIG. 4(A)

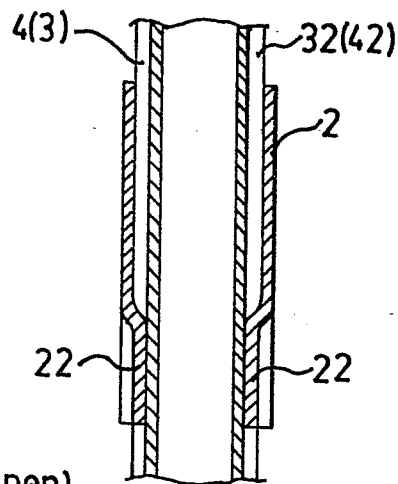


FIG. 4(B)

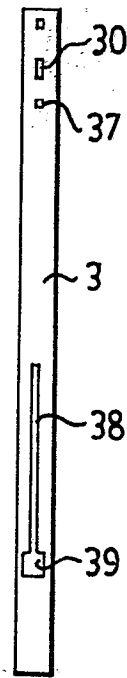


FIG. 5

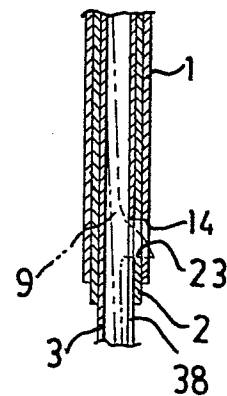


FIG. 7



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	US-A-4 421 133 (HUANG) * column 1, line 62 - column 2, line 53; figures 1a-1d *	1,5	A 45 B 25/16
A	DE-C- 34 988 (MATHIEU)		
A	FR-A-2 057 021 (K.K. IDEAL)		
D, A	FR-A-2 185 372 (K.K. IDEAL)		
A	FR-A-2 089 737 (K.K. IDEAL)		
A	FR-A-2 528 288 (FU TAI UMBRELLA WORKS)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			A 45 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10-10-1984	Examiner SIGWALT C.
CATEGORY OF CITED DOCUMENTS			
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